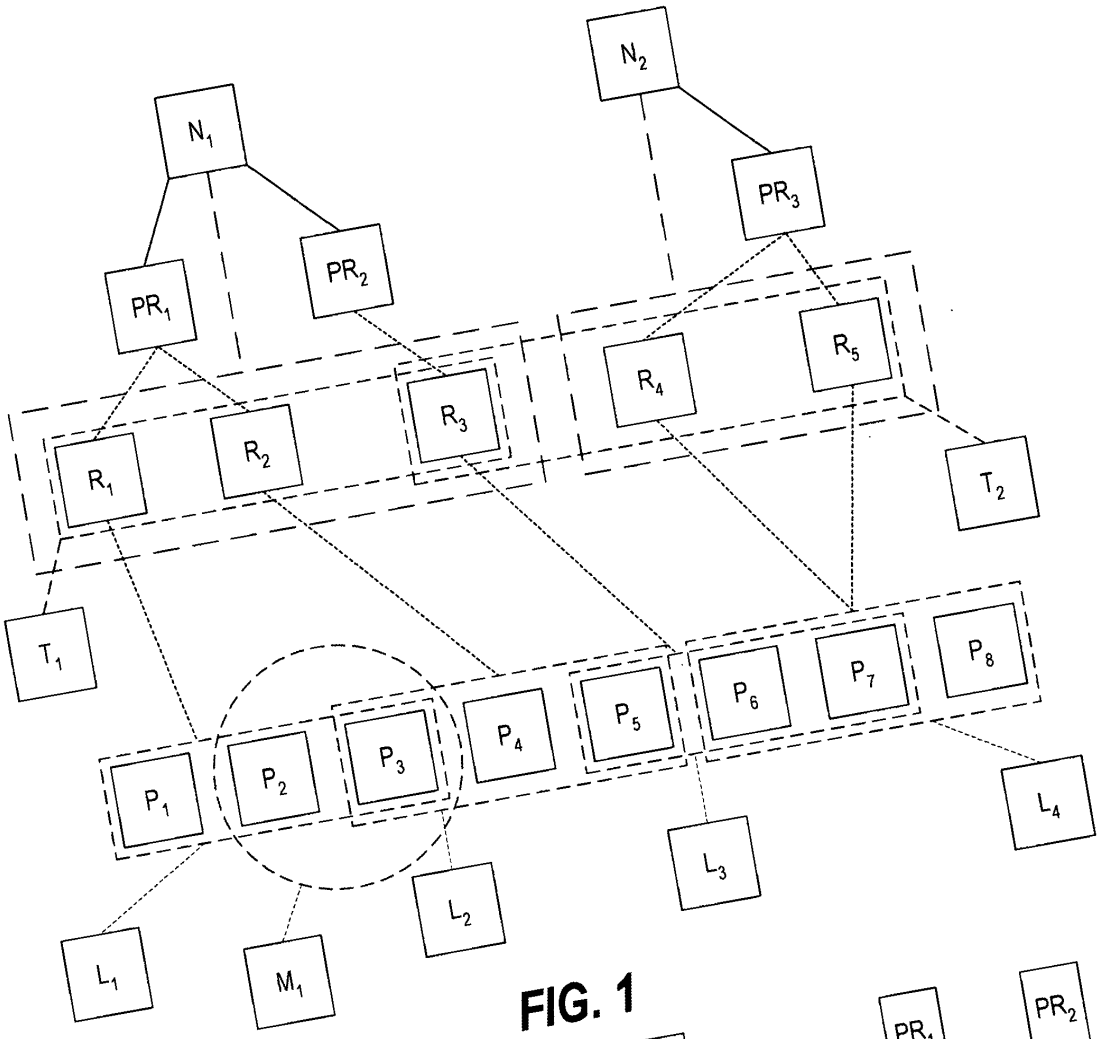

FIG. 1

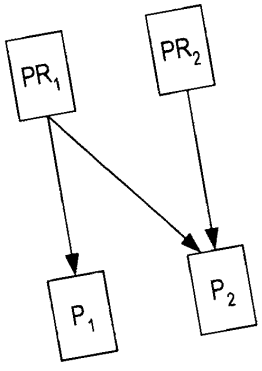

FIG. 2A

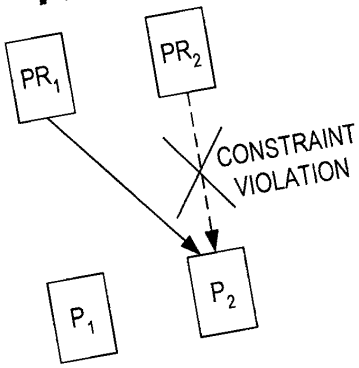

FIG. 2B

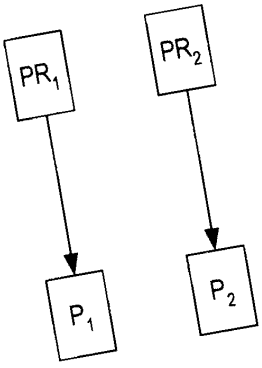

FIG. 2C

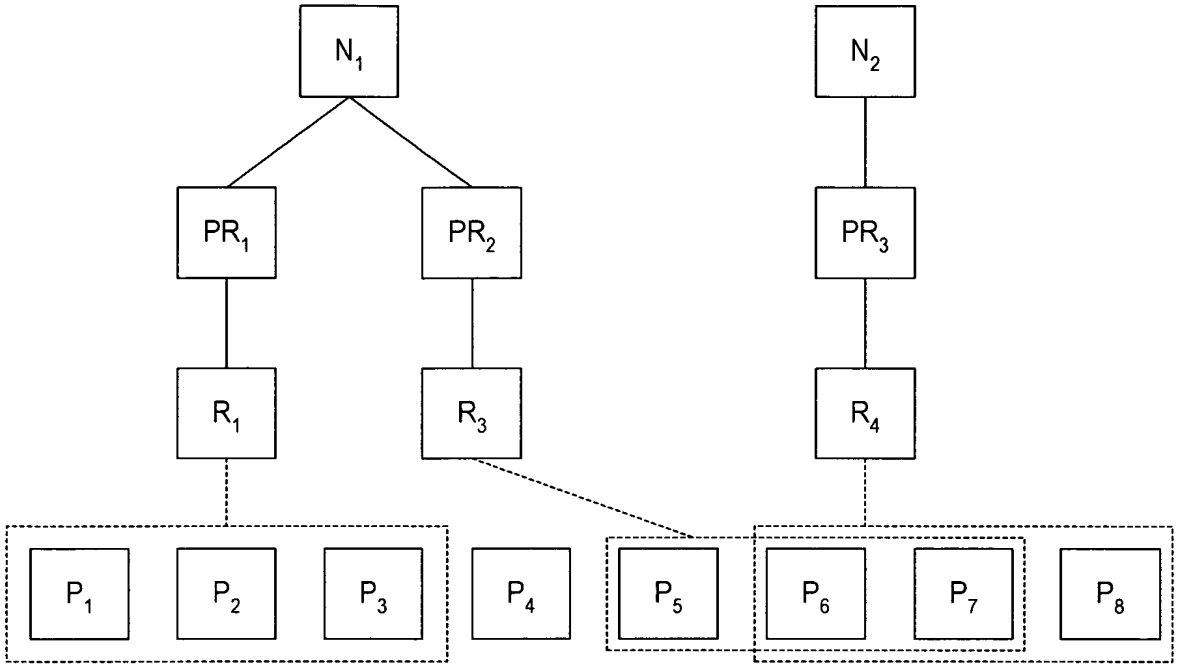

FIG. 3A

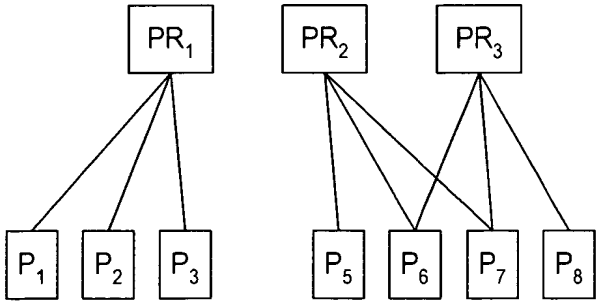

FIG. 3B

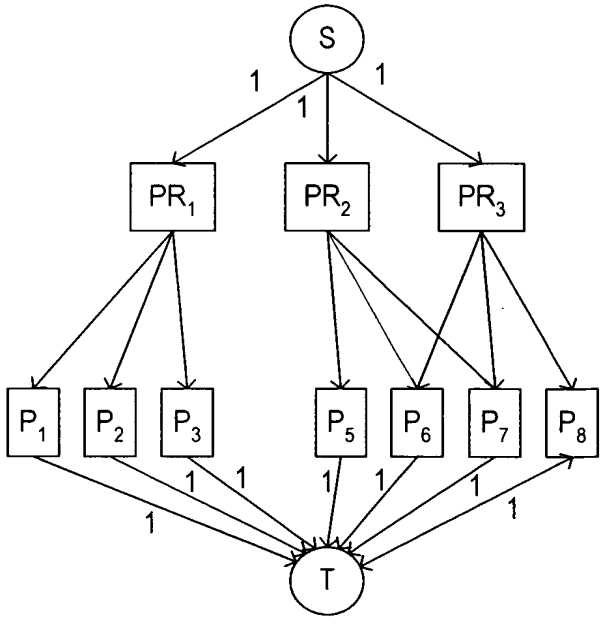

FIG. 3C

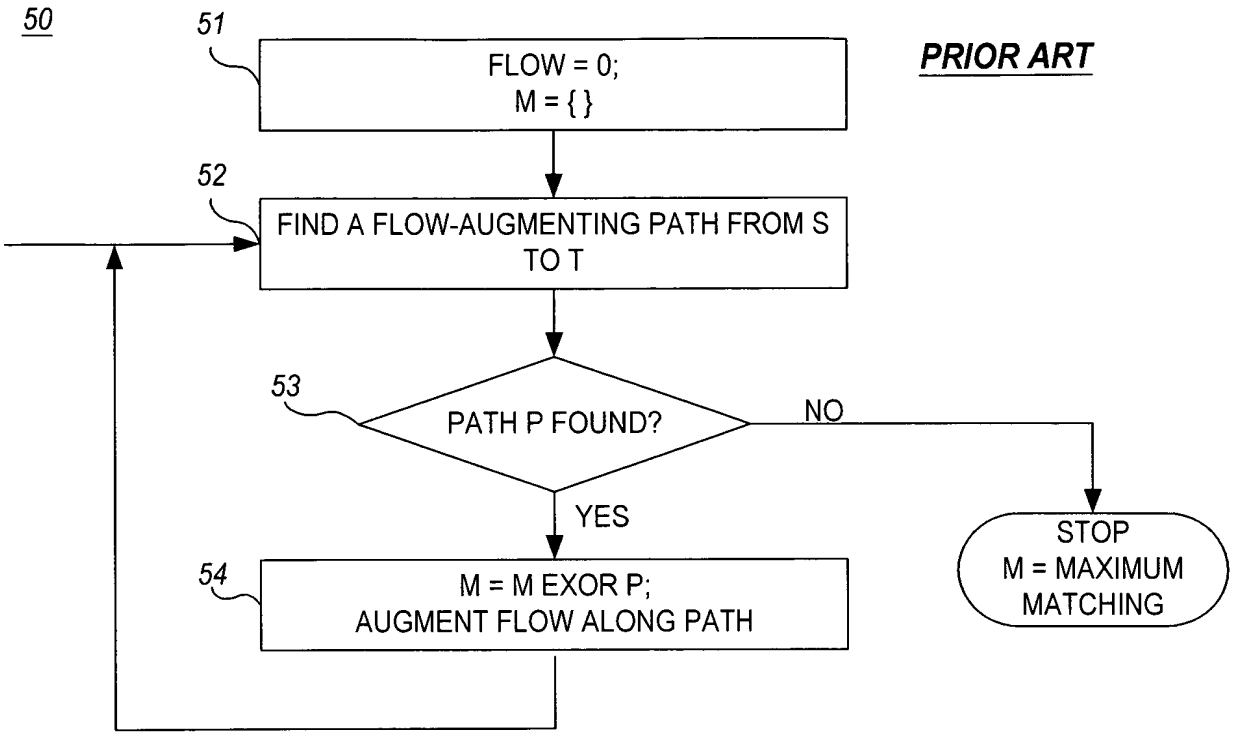
50
51
FLOW = 0;
M = { }
PRIOR ART
52
FIND A FLOW-AUGMENTING PATH FROM S TO T
53
PATH P FOUND?
NO
YES
STOP
M = MAXIMUM MATCHING
54
M = M EXOR P;
AUGMENT FLOW ALONG PATH

FIG. 4

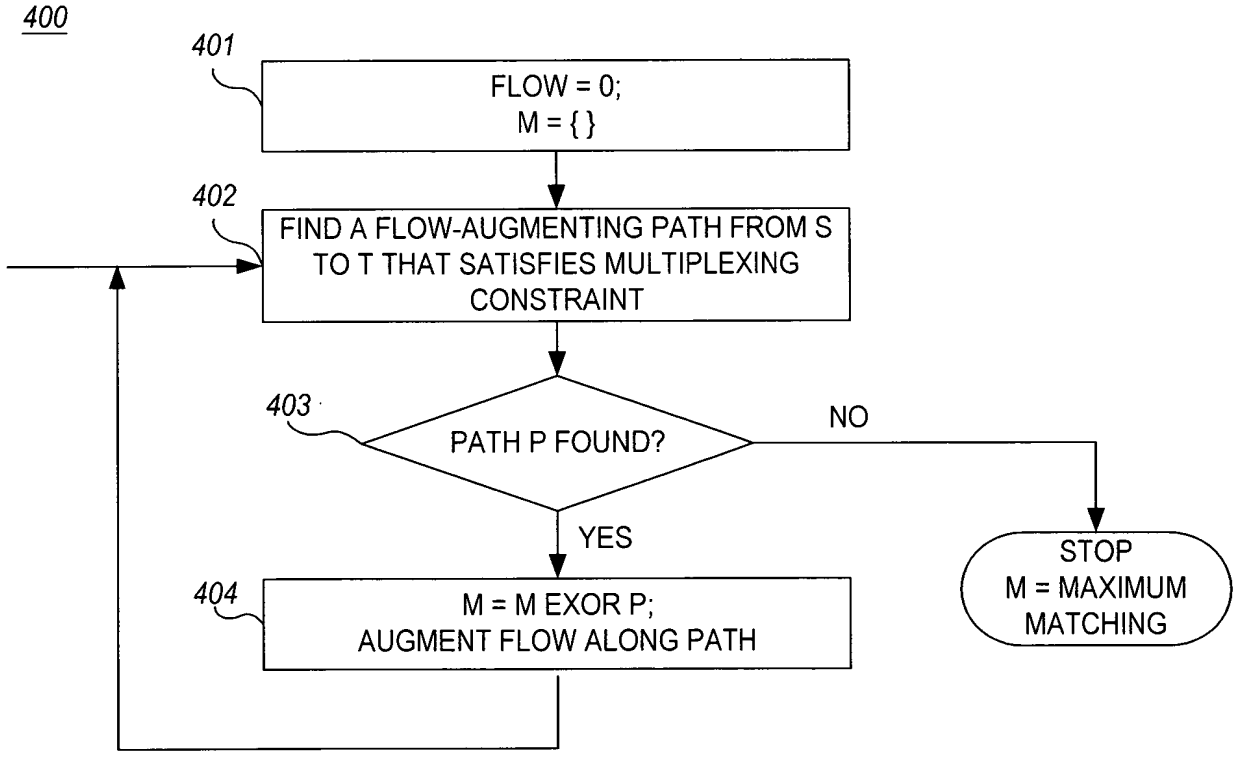
400
401
FLOW = 0;
M = { }
402
FIND A FLOW-AUGMENTING PATH FROM S TO T THAT SATISFIES MULTIPLEXING CONSTRAINT
403
PATH P FOUND?
NO
YES
STOP
M = MAXIMUM MATCHING
404
M = M EXOR P;
AUGMENT FLOW ALONG PATH

FIG. 8

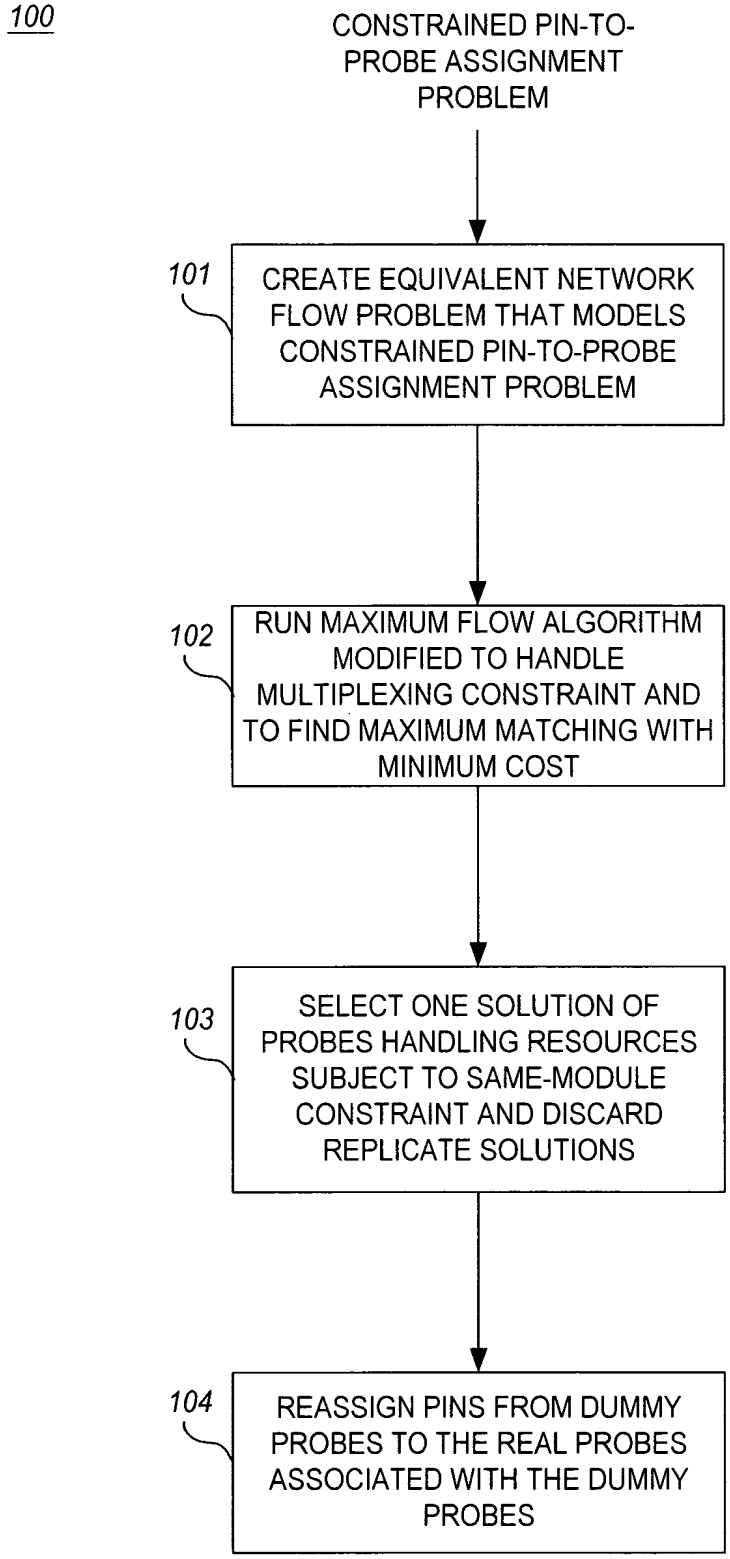
100
CONSTRAINED PIN-TO-PROBE ASSIGNMENT PROBLEM
101
CREATE EQUIVALENT NETWORK FLOW PROBLEM THAT MODELS CONSTRAINED PIN-TO-PROBE ASSIGNMENT PROBLEM
102
RUN MAXIMUM FLOW ALGORITHM MODIFIED TO HANDLE MULTIPLEXING CONSTRAINT AND TO FIND MAXIMUM MATCHING WITH MINIMUM COST
103
SELECT ONE SOLUTION OF PROBES HANDLING RESOURCES SUBJECT TO SAME-MODULE CONSTRAINT AND DISCARD REPLICATE SOLUTIONS
104
REASSIGN PINS FROM DUMMY PROBES TO THE REAL PROBES ASSOCIATED WITH THE DUMMY PROBES

FIG. 5

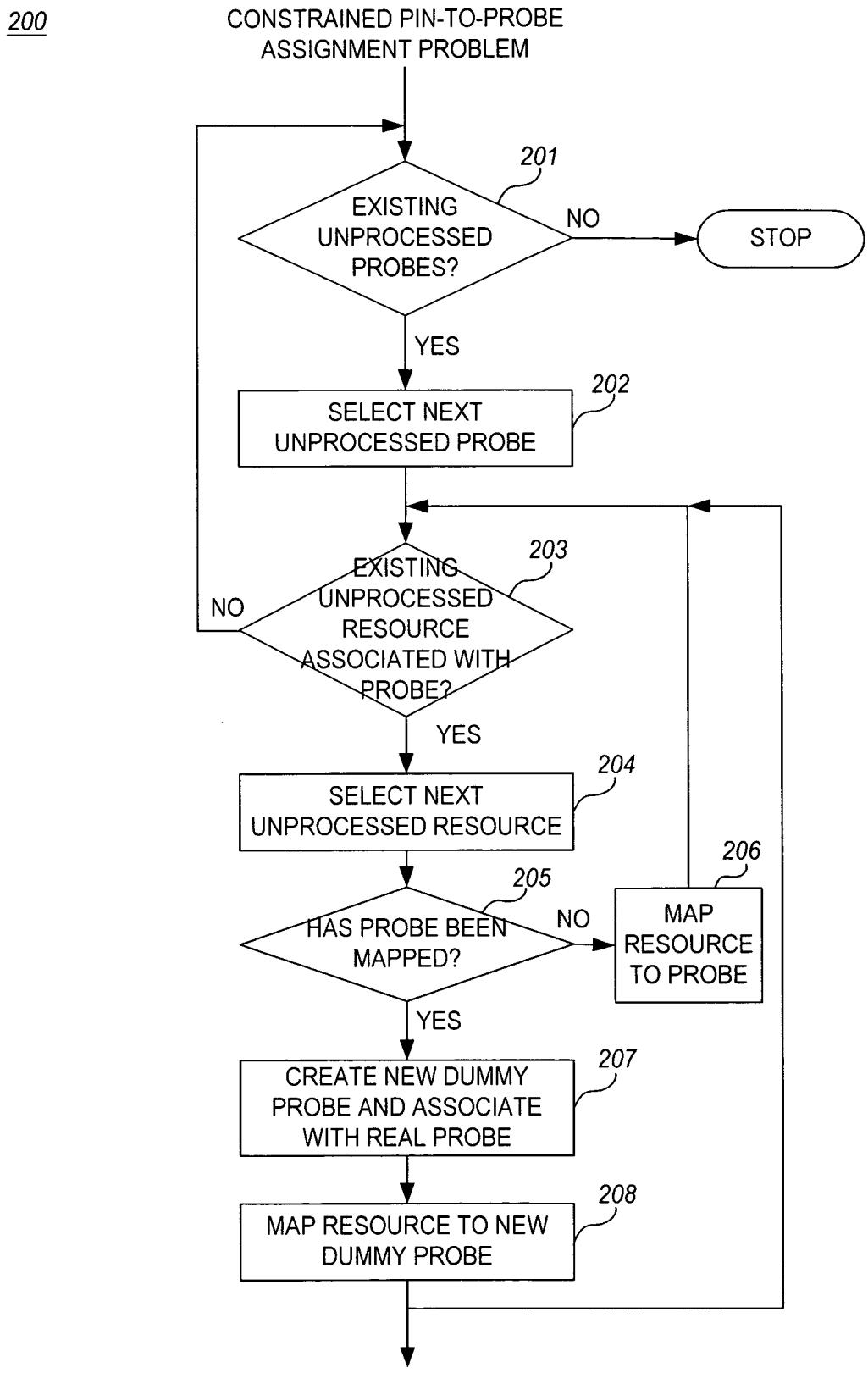
200
CONSTRAINED PIN-TO-PROBE ASSIGNMENT PROBLEM
201
EXISTING UNPROCESSED PROBES?
NO
STOP
YES
202
SELECT NEXT UNPROCESSED PROBE
203
EXISTING UNPROCESSED RESOURCE ASSOCIATED WITH PROBE?
NO
YES
204
SELECT NEXT UNPROCESSED RESOURCE
205
HAS PROBE BEEN MAPPED?
NO
206
MAP RESOURCE TO PROBE
YES
207
CREATE NEW DUMMY PROBE AND ASSOCIATE WITH REAL PROBE
208
MAP RESOURCE TO NEW DUMMY PROBE

FIG. 6A

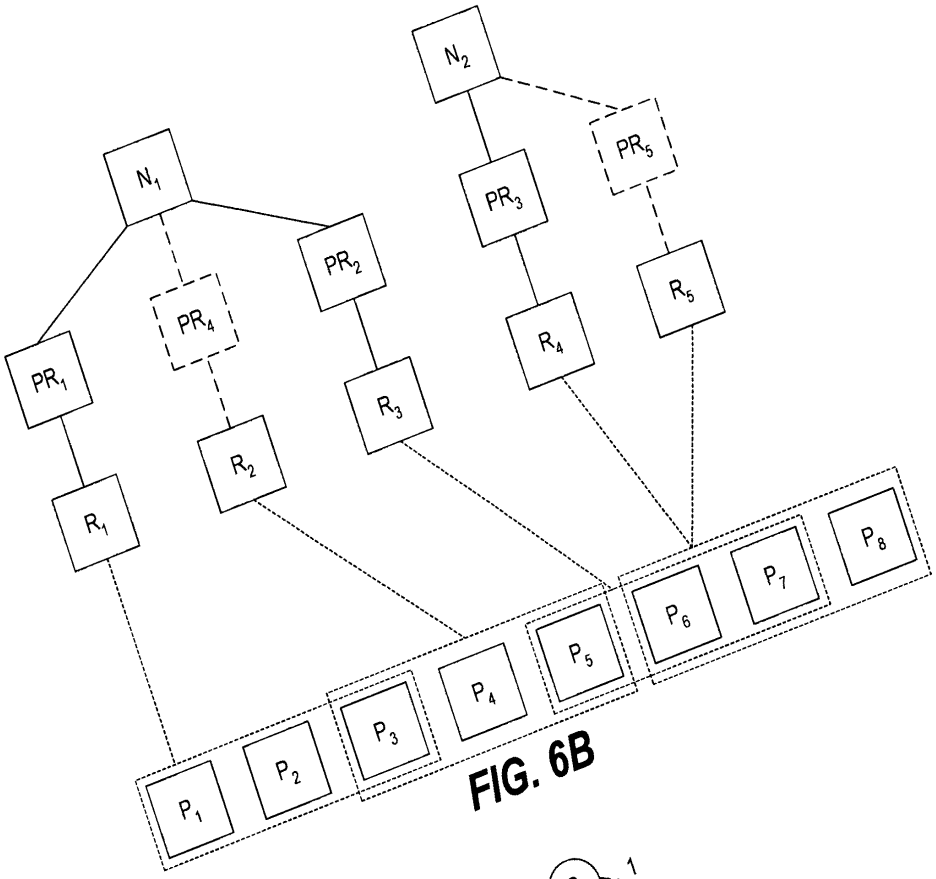
N1
N2
PR1
PR2
PR3
PR4
PR5
R1
R2
R3
R4
R5
P1
P2
P3
P4
P5
P6
P7
P8

FIG. 6B

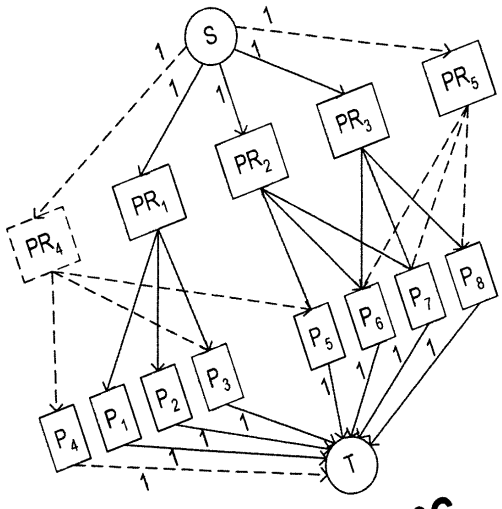
S
T
PR1
PR2
PR3
PR4
PR5
P1
P2
P3
P4
P5
P6
P7
P8
1

FIG. 6C

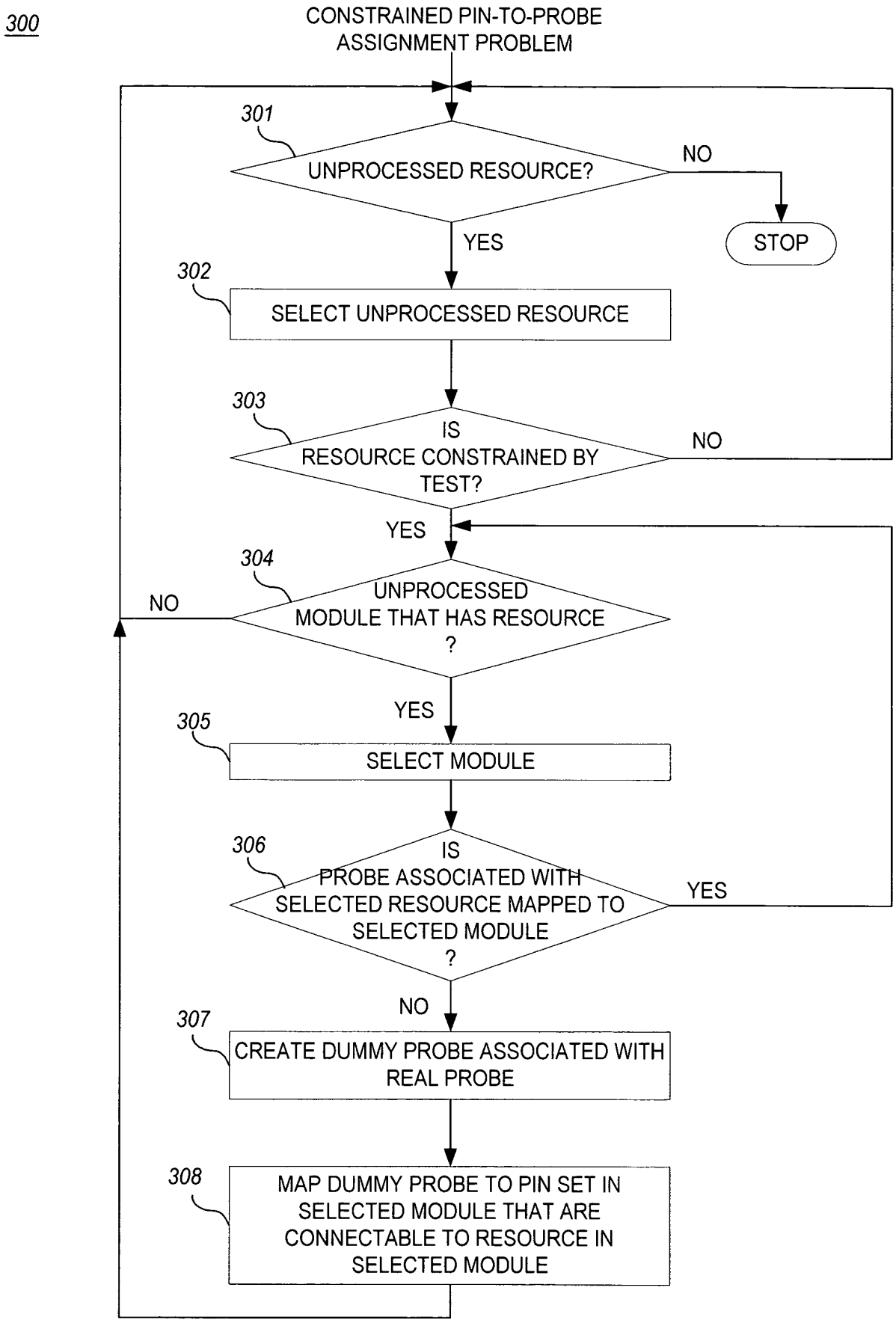
300
CONSTRAINED PIN-TO-PROBE ASSIGNMENT PROBLEM
301
UNPROCESSED RESOURCE?
NO
STOP
YES
302
SELECT UNPROCESSED RESOURCE
303
IS RESOURCE CONSTRAINED BY TEST?
NO
YES
304
UNPROCESSED MODULE THAT HAS RESOURCE ?
NO
YES
305
SELECT MODULE
306
IS PROBE ASSOCIATED WITH SELECTED RESOURCE MAPPED TO SELECTED MODULE ?
YES
NO
307
CREATE DUMMY PROBE ASSOCIATED WITH REAL PROBE
308
MAP DUMMY PROBE TO PIN SET IN SELECTED MODULE THAT ARE CONNECTABLE TO RESOURCE IN SELECTED MODULE

FIG. 7A

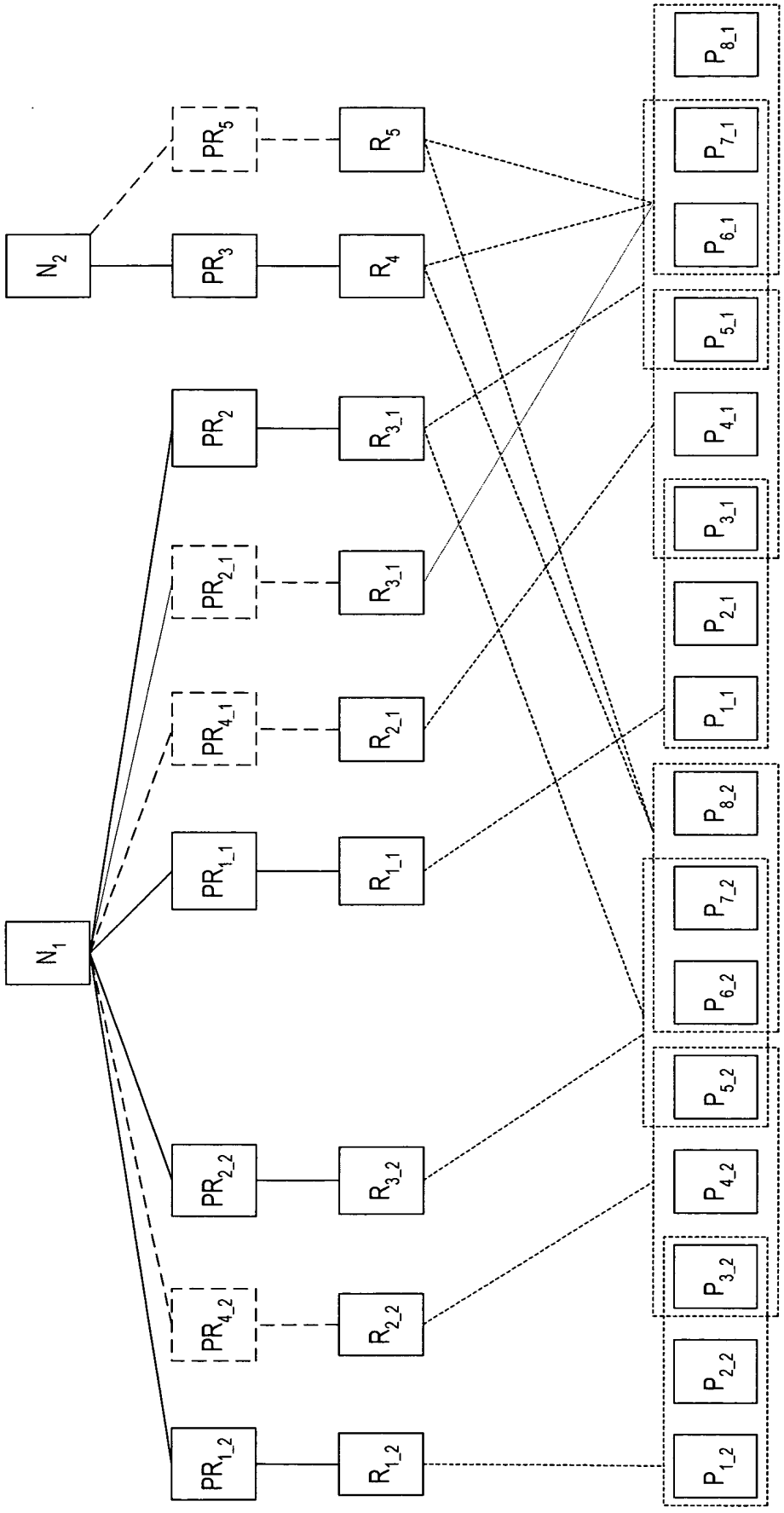
N1
N2
PR1_2
PR4_2
PR2_2
PR1_1
PR4_1
PR2_1
PR2
PR3
PR5
R1_2
R2_2
R3_2
R1_1
R2_1
R3_1
R3_1
R4
R5
P1_2
P2_2
P3_2
P4_2
P5_2
P6_2
P7_2
P8_2
P1_1
P2_1
P3_1
P4_1
P5_1
P6_1
P7_1
P8_1

FIG. 7B

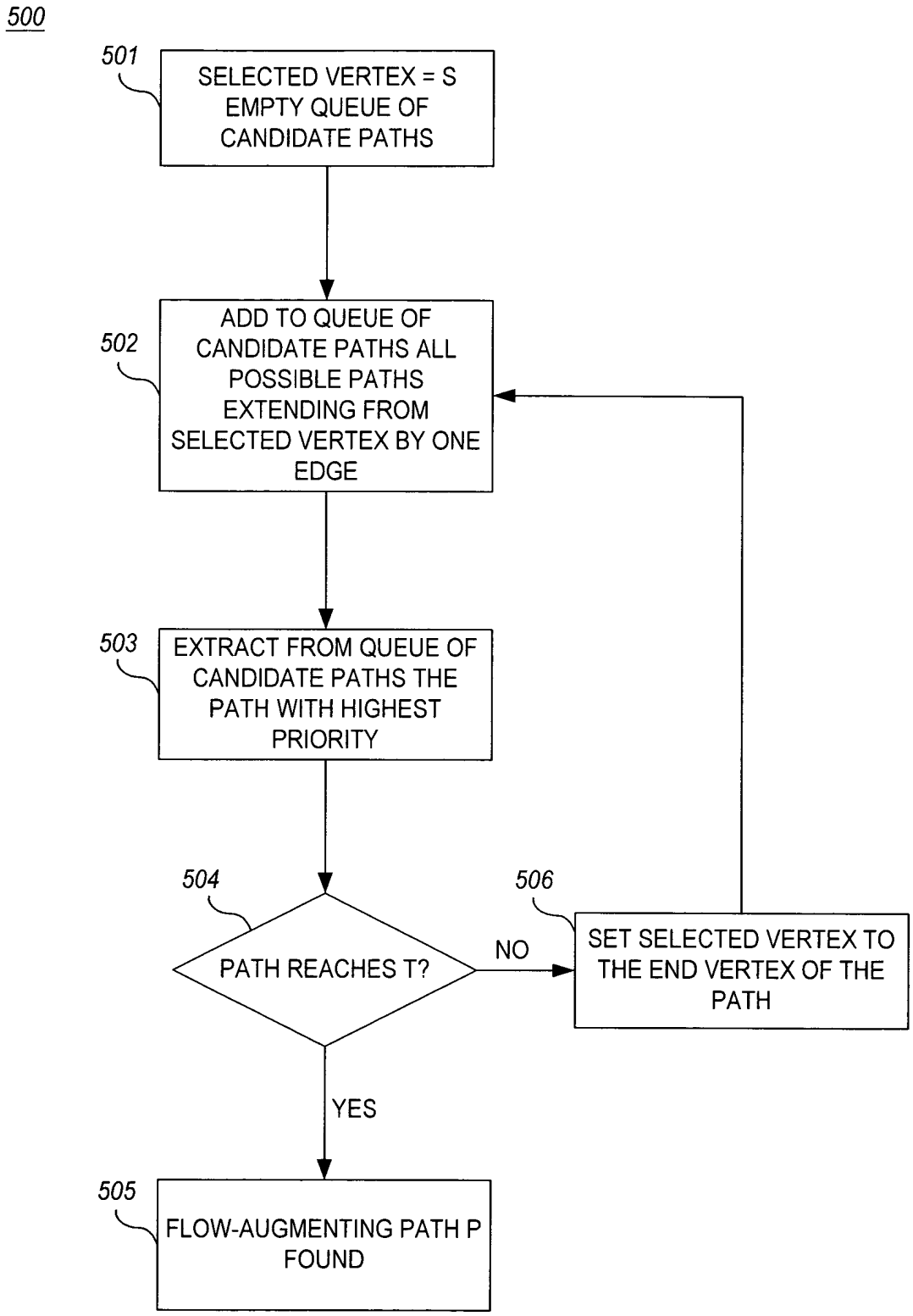
500
501
SELECTED VERTEX = S
EMPTY QUEUE OF CANDIDATE PATHS
502
ADD TO QUEUE OF CANDIDATE PATHS ALL POSSIBLE PATHS EXTENDING FROM SELECTED VERTEX BY ONE EDGE
503
EXTRACT FROM QUEUE OF CANDIDATE PATHS THE PATH WITH HIGHEST PRIORITY
504
PATH REACHES T?
NO
506
SET SELECTED VERTEX TO THE END VERTEX OF THE PATH
YES
505
FLOW-AUGMENTING PATH P FOUND

FIG. 9

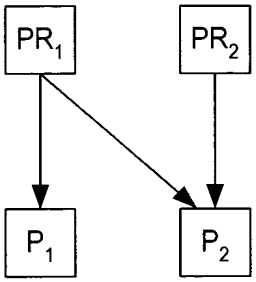

FIG. 10A

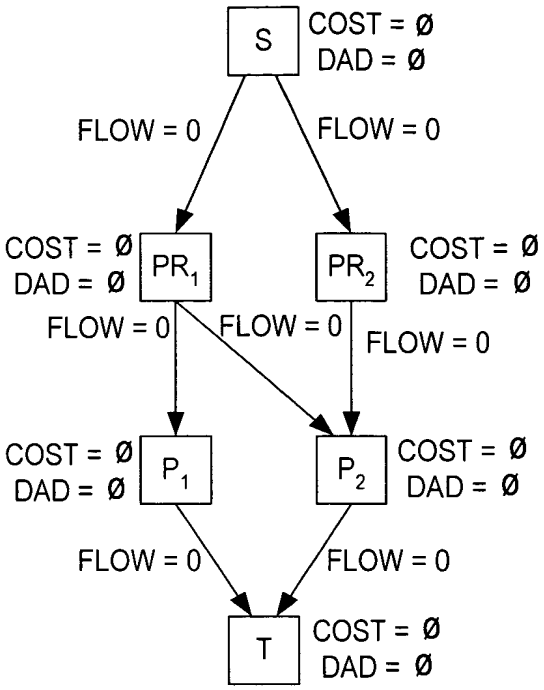

FIG. 10B

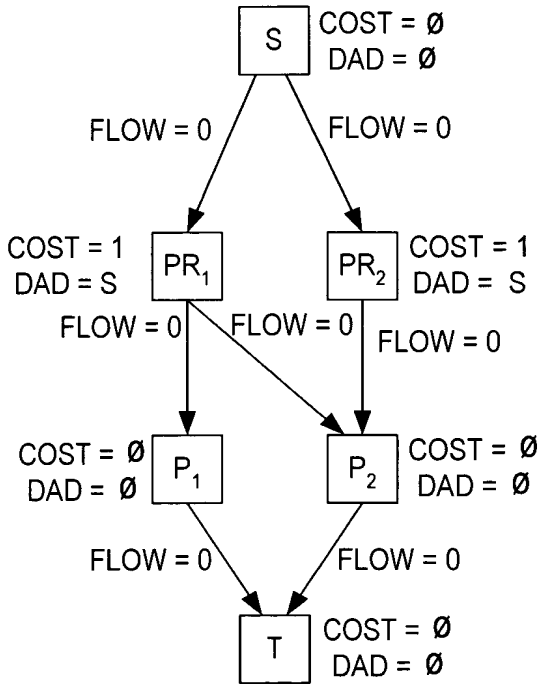

FIG. 10C

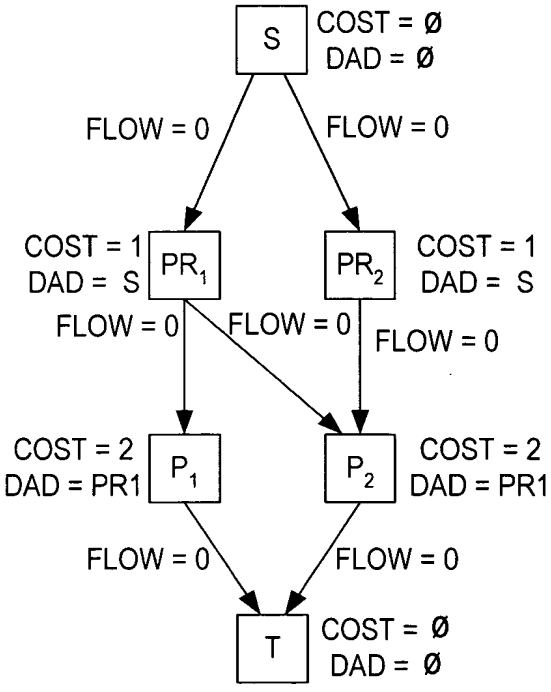

FIG. 10D

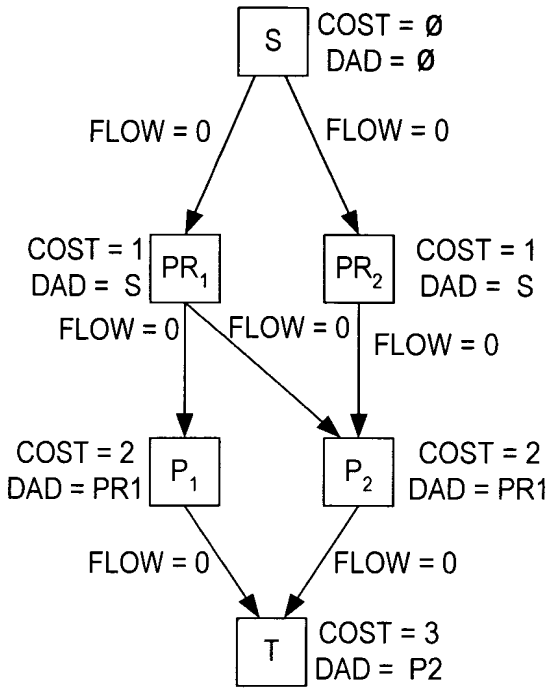

FIG. 10E

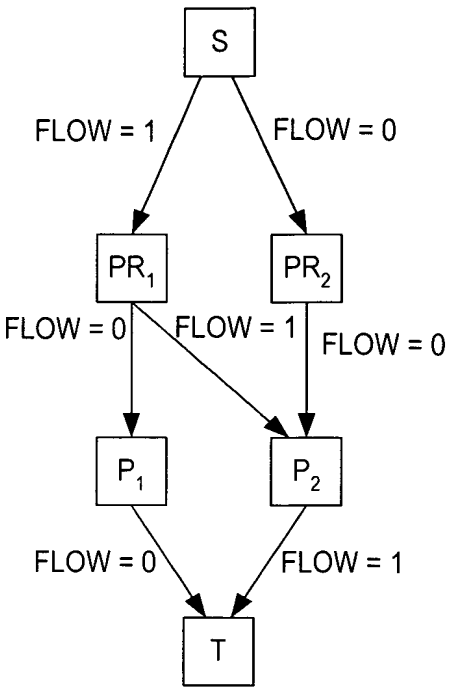

FIG. 10F

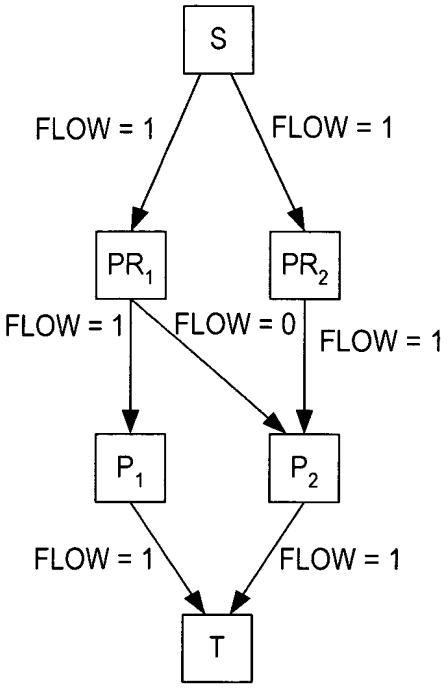

FIG. 10G

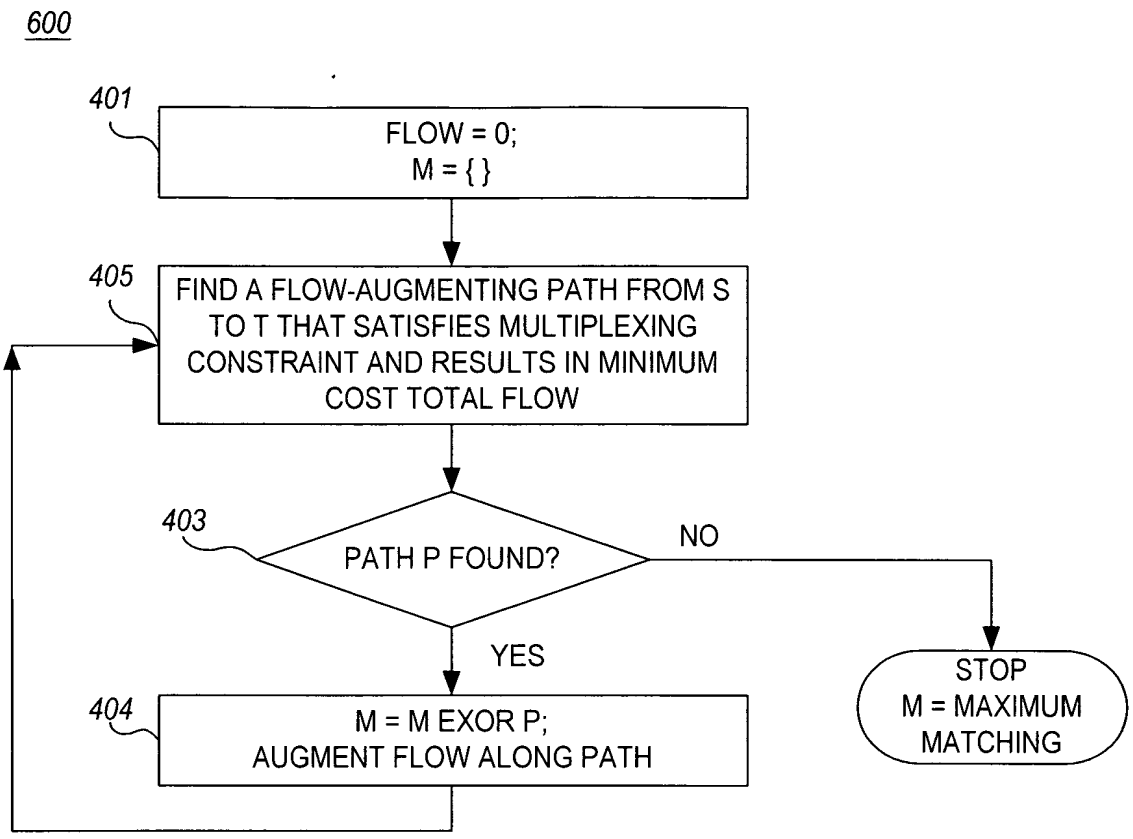
600
401
FLOW = 0;
M = { }
405
FIND A FLOW-AUGMENTING PATH FROM S TO T THAT SATISFIES MULTIPLEXING CONSTRAINT AND RESULTS IN MINIMUM COST TOTAL FLOW
403
PATH P FOUND?
NO
YES
STOP
M = MAXIMUM MATCHING
404
M = M EXOR P;
AUGMENT FLOW ALONG PATH

FIG. 11

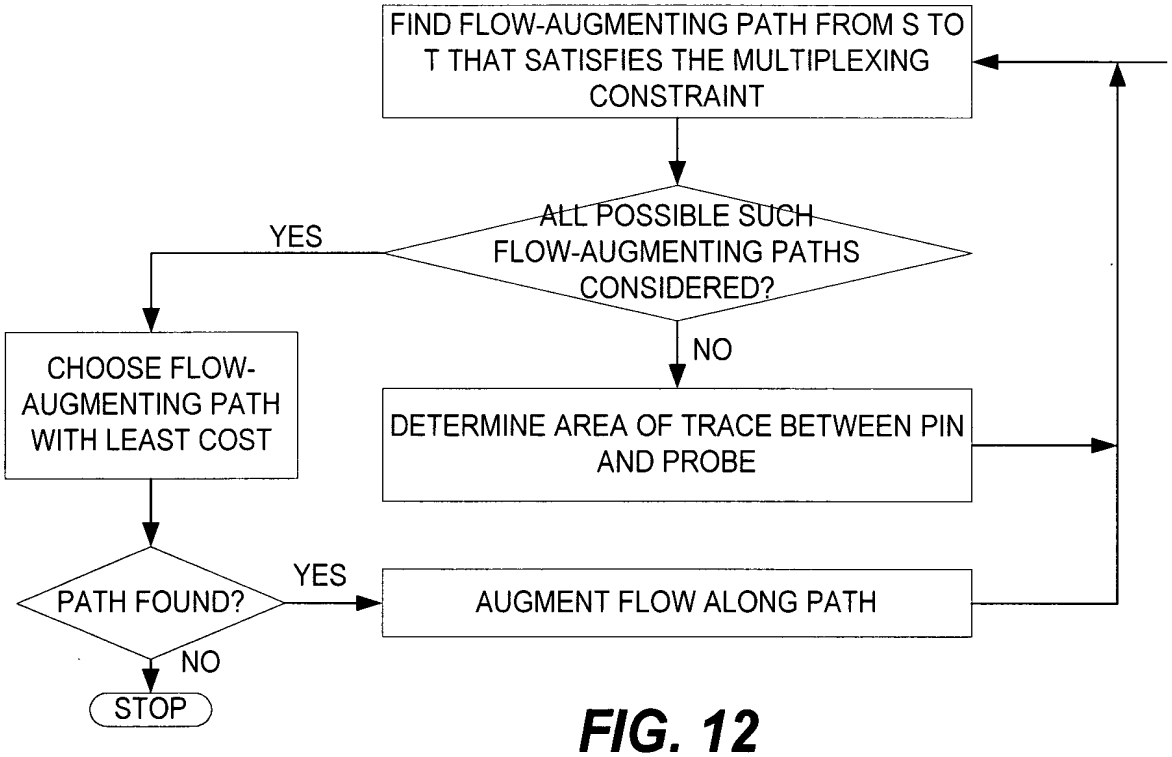
FIND FLOW-AUGMENTING PATH FROM S TO T THAT SATISFIES THE MULTIPLEXING CONSTRAINT
ALL POSSIBLE SUCH FLOW-AUGMENTING PATHS CONSIDERED?
YES
NO
CHOOSE FLOW-AUGMENTING PATH WITH LEAST COST
DETERMINE AREA OF TRACE BETWEEN PIN AND PROBE
PATH FOUND?
YES
NO
AUGMENT FLOW ALONG PATH
STOP

FIG. 12

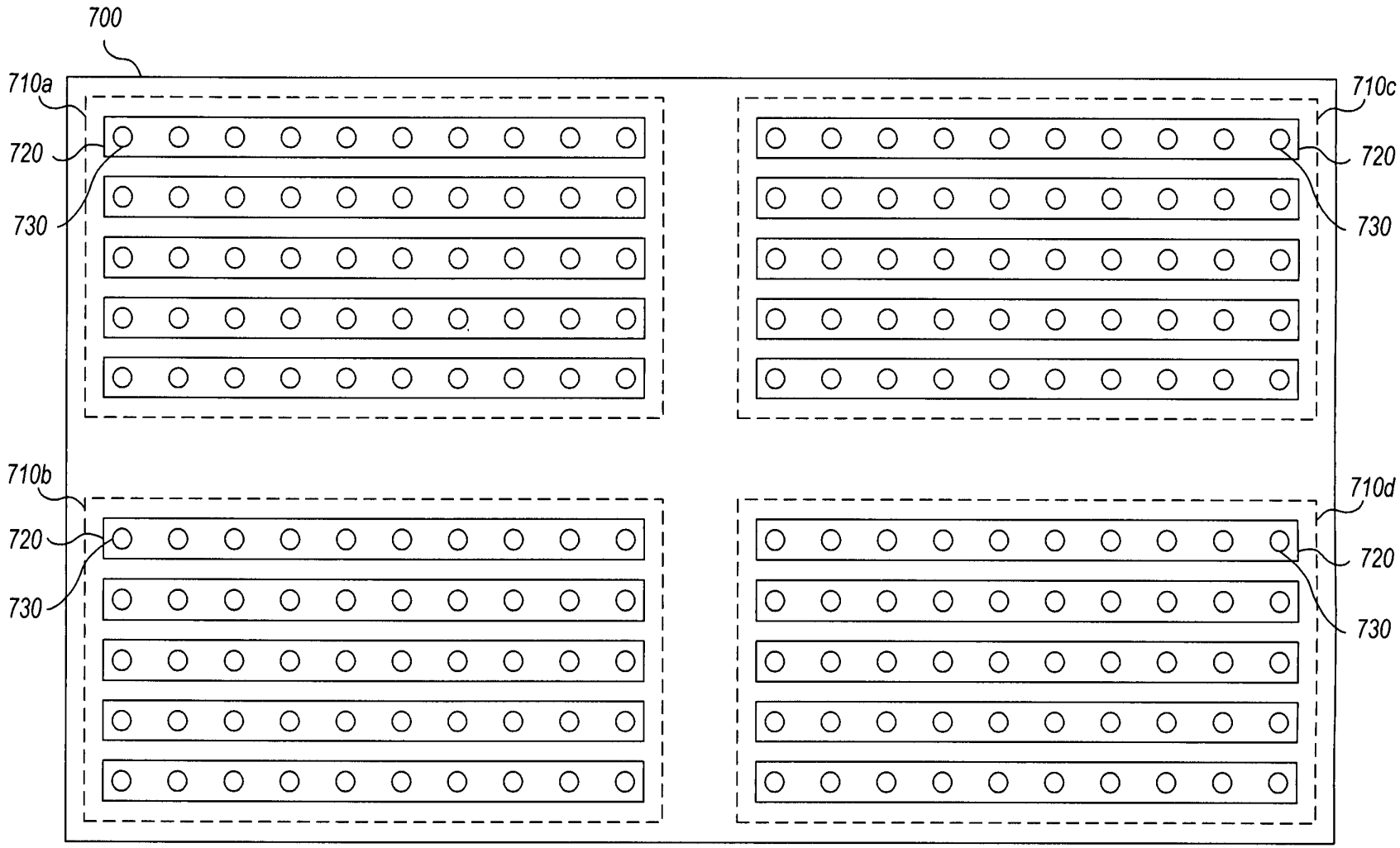

FIG. 13A

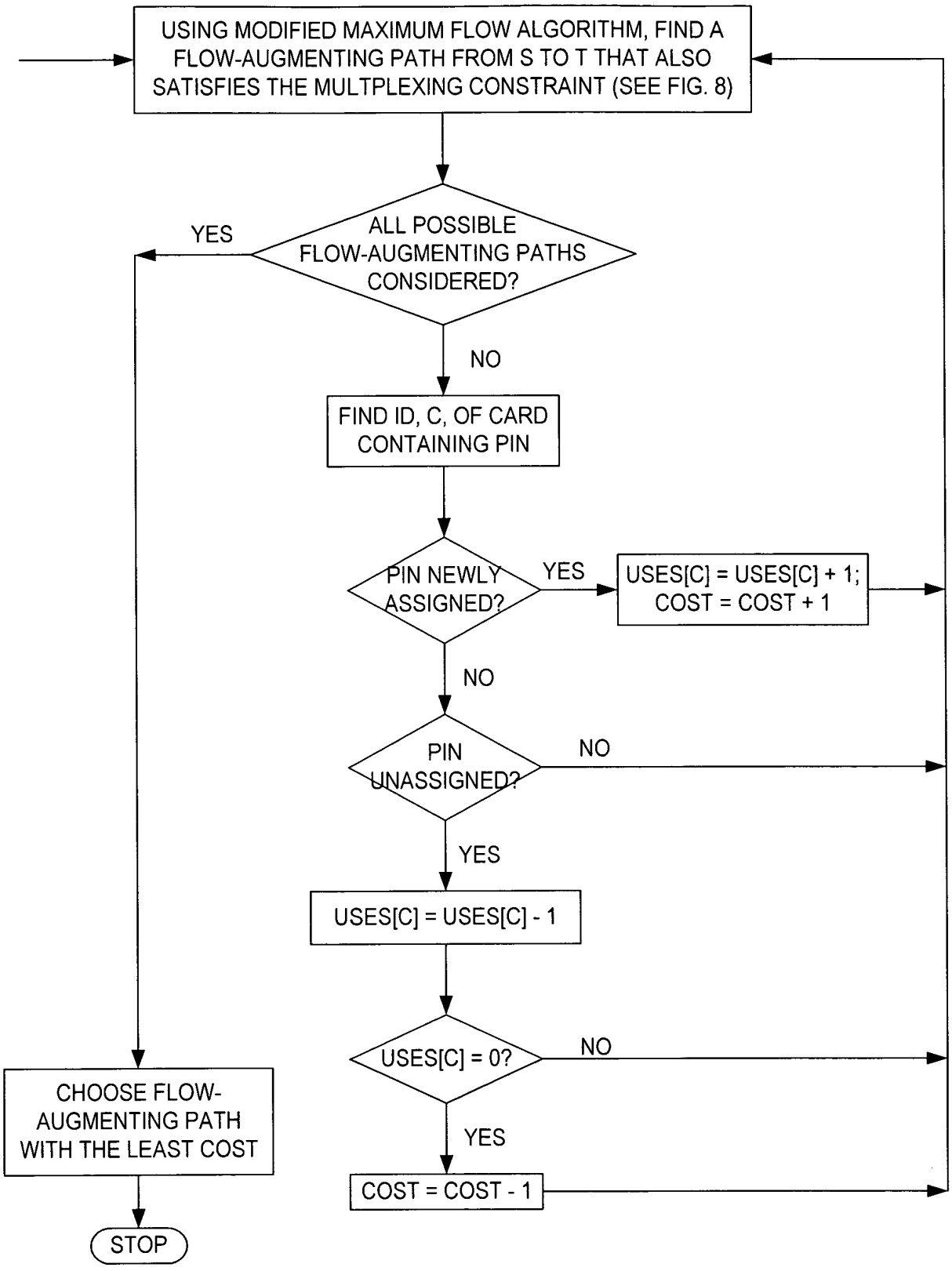
USING MODIFIED MAXIMUM FLOW ALGORITHM, FIND A FLOW-AUGMENTING PATH FROM S TO T THAT ALSO SATISFIES THE MULTPLEXING CONSTRAINT (SEE FIG. 8)
ALL POSSIBLE FLOW-AUGMENTING PATHS CONSIDERED?
YES
NO
FIND ID, C, OF CARD CONTAINING PIN
PIN NEWLY ASSIGNED?
YES
USES[C] = USES[C] + 1; COST = COST + 1
NO
PIN UNASSIGNED?
NO
YES
USES[C] = USES[C] - 1
USES[C] = 0?
NO
YES
COST = COST - 1
CHOOSE FLOW-AUGMENTING PATH WITH THE LEAST COST
STOP

FIG. 13B